INTERNATIONAL STANDARD

ISO 7176-9

Second edition
2001-10-15

Wheelchairs —

Part 9: Climatic tests for electric wheelchairs

Fauteuils roulants —

Partie 9: Essais climatiques pour fauteuils roulants électriques

Reference number
ISO 7176-9:2001(E)

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Printed in Switzerland

Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 7176 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 7176-9 was prepared by Technical Committee ISO/TC 173, *Technical systems and aids for disabled or handicapped persons*, Subcommittee SC 1, *Wheelchairs*.

This second edition cancels and replaces the first edition (ISO 7176-9:1988), clauses and figures of which have been technically revised.

ISO 7176 consists of the following parts, under the general title *Wheelchairs*:

— *Part 1: Determination of static stability*

— *Part 2: Determination of dynamic stability of electric wheelchairs*

— *Part 3: Determination of efficiency of brakes*

— *Part 4: Energy consumption of electric wheelchairs and scooters for determination of theoretical distance range*

— *Part 5: Determination of overall dimensions, mass and turning space*

— *Part 6: Determination of maximum speed, acceleration and retardation of electric wheelchairs*

— *Part 7: Measurement of seating and wheel dimensions*

— *Part 8: Requirements and test methods for static, impact and fatigue strengths*

— *Part 9: Climatic tests for electric wheelchairs*

— *Part 10: Determination of obstacle-climbing ability of electric wheelchairs*

— *Part 11: Test dummies*

— *Part 13: Determination of coefficient of friction of test surfaces*

— *Part 14: Power and control systems for electric wheelchairs — Requirements and test methods*

— *Part 15: Requirements for information disclosure, documentation and labelling*

— *Part 16: Resistance to ignition of upholstered parts — Requirements and test methods*

— *Part 22: Set-up procedures*

The following parts are also on the work programme:

— *Part 19: Wheeled mobility devices for use in motor vehicles*

— *Part 21: Electromagnetic compatibility of electrically powered wheelchairs and motorized scooters — Requirements and test methods*

— *Part 23: Requirements and test methods for attendant-operated stair-climbing devices*

— *Part 24: User-operated stair-climbing devices — Requirements and test methods*

Introduction

Wheelchairs may be used or stored in adverse environmental conditions which may severely affect their functioning, sometimes to the extent of being dangerous.

These tests have been developed to determine if and to what extent wheelchairs are vulnerable to environmental conditions.

Operation is tested in rain, hot and cold conditions which simulate use in some of the wider climatic variations experienced around the world.

Wheelchairs —

Part 9:
Climatic tests for electric wheelchairs

1 Scope

This part of ISO 7176 specifies requirements and test methods to determine the effects of rain and condensation and the effects of changes of temperature on the basic functioning of electrically powered wheelchairs, including scooters, intended to carry one person, with a maximum speed not exceeding 15 km/h.

This part of ISO 7176 does not include requirements for resistance to corrosion.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 7176. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 7176 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 6440, *Wheelchairs — Nomenclature, terms and definitions*

ISO 7176-11, *Wheelchairs — Part 11: Test dummies*

ISO 7176-15, *Wheelchairs — Part 15: Requirements for information disclosure, documentation and labelling*

ISO 7176-22, *Wheelchairs — Part 22: Set-up procedures*

IEC 60529 (2001), *Degrees of protection provided by enclosures (IP Code)*

3 Terms and definitions

For the purposes of this part of ISO 7176, the terms and definitions given in ISO 6440 and the following apply.

3.1
control device
means by which the user directs the wheelchair to move at the desired speed and/or in the direction of travel

3.2
standard ambient conditions
environmental conditions of (20 ± 5) °C and relative humidity of (60 ± 20) %

4 Principle

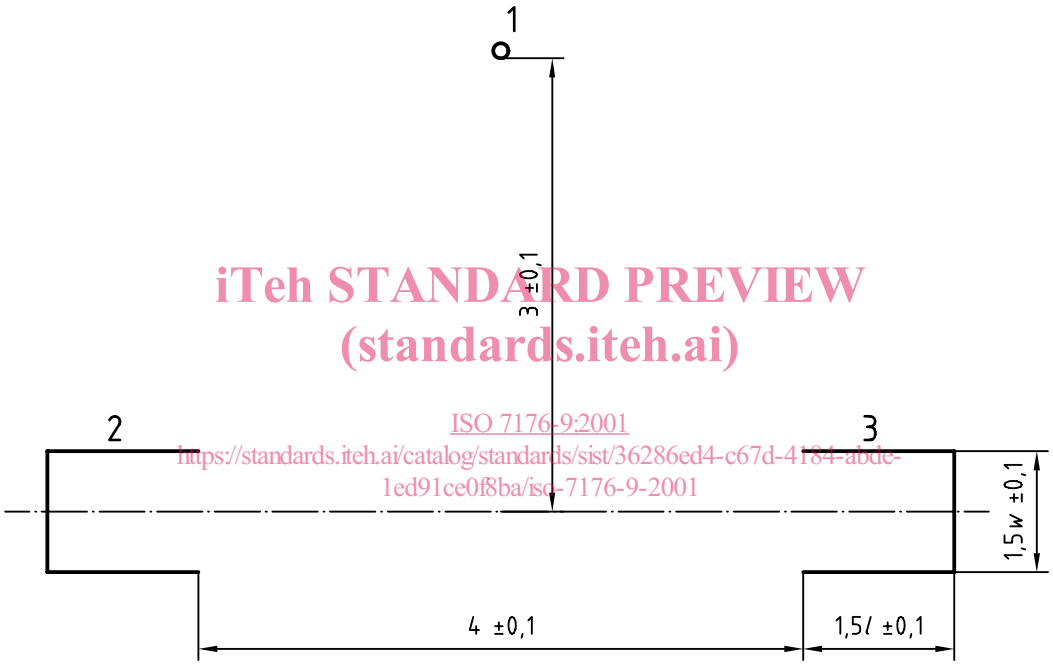
The functioning of the wheelchair is tested after it has been exposed to environmental conditions which are expected in normal use, storage and transportation.

5 Apparatus

5.1 Test track marked as shown in Figure 1 and consisting of a flat, horizontal plane at standard ambient conditions.

NOTE The floor of a typical large building used for manufacturing or indoor leisure with, for example, a concrete or asphalt floor is acceptable.

Dimensions in metres



Key

1 Marker (M)
2 Rectangle A
3 Rectangle B

Figure 1 — Test track

The markings consist of the following:

— a single marker (M) with no horizontal dimensions greater than 200 mm;

— two open rectangles A and B with

length, $L = 1{,}5l \pm 100$ mm and

width, $W = 1{,}5w \pm 100$ mm.

where

l = length and w = width of the wheelchair.

5.2 Test dummy, as specified in ISO 7176-11, or a human test driver with supplementary weights added to give the mass distribution equivalent to the relevant dummy.

5.3 Test wheelchair drive method, which may be a remote controller or a human test driver.

NOTE Mass added to the wheelchair for the purposes of control or instrumentation should not significantly affect the overall mass distribution of the wheelchair. The overall mass of the loaded wheelchair may be adjusted to compensate for any such added mass.

5.4 Temperature measurement device to measure ambient air temperature to an accuracy of ± 1 °C.

5.5 Timing measurement device to measure time to an accuracy of ± 1 s.

5.6 Humidity measurement device to measure relative humidity to an accuracy of ± 2 %.

5.7 Cold test environment to subject a wheelchair to ambient conditions of (– 40 ± 5) °C and ($-25\ ^{+2}_{-5}$) °C.

5.8 Hot test environment to subject a wheelchair to ambient conditions of ($50\ ^{+5}_{-2}$) °C and (65 ± 5) °C.

5.9 Ambient test environment to subject a wheelchair to standard ambient conditions (3.2).

5.10 Water spray device to spray water as specified in IEC 60529.

6 Preparation of test wheelchair

a) Set up the wheelchair as specified in ISO 7176-22. Apart from removing and replacing the test dummy or human load or batteries, do not change the set-up of the wheelchair while carrying out the following test procedures.

NOTE 1 The dummy or test driver should be placed in the wheelchair only during the functional testing specified in clause 8.

b) Make provision to detect any movement of driven parts of the wheelchair during the tests.

NOTE 2 Provision can be made, for example, by making marks on the driven wheels, seat raising mechanism, backrest recline systems, etc.

7 Test method

7.1 General

Conduct the tests specified in 7.3 to 7.7. The tests may be performed in any sequence.

7.2 Requirement

The wheelchair shall continue to function according to the manufacturer's specification after being subjected to each of the climatic tests specified in 7.3 to 7.7.

The wheelchair fails the test if:

a) it fails to meet any of the requirements of the functional check specified in clause 8 whenever performed during the tests specified in 7.3 to 7.7, or

b) if any driven part exhibits unintended movement during climatic tests of 7.3 to 7.7.